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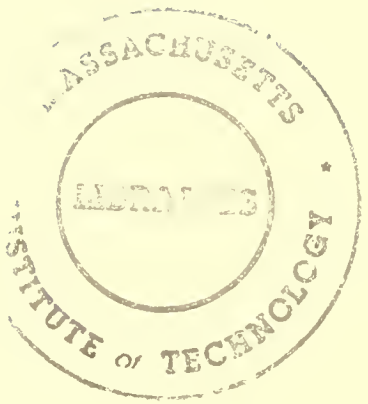
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Management by Maxim: Creating Business Driven Information Technology Infrastructures

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MANAGEMENT BY MAXIM: CREATING BUSINESS DRIVEN INFORMATION TECHNOLOGY INFRASTRUCTURES

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ABSTRACT

Information technology (IT) infrastructure capabilities are critical to how firms compete in the marketplace. This is particularly the case for firms in industries going through dynamic change, for firms reengineering their business processes, and for those with extensive international or geographically dispersed operations. Yet infrastructure investments are fraught with difficulty as they often have to be made in advance of specific business strategies.

This paper explains how business driven IT infrastructures are created in successful firms and why this is important. Some firms make no investment in firm-wide infrastructure and this might be appropriate, while others invest up to 10% of their revenues in IT infrastructure, such as communication networks, databases, and expertise that is shared across multiple business units. Both approaches can be correct, provided they each match firm specific needs.

Creating business driven IT infrastructure involves a series of decision points based on a sound understanding of the firm's strategic context. This understanding is articulated and communicated through a series of business maxims. These strategic statements capture the essence of the future direction of the firm. Business maxims lead to the identification of IT maxims which express how information technology resources should be deployed and the ways in which information and data needs to be accessed and used. IT maxims provide a basis for decision making about how the firm should view IT infrastructure and the specific infrastructure services required. Developing successful infrastructures is the joint responsibility of executive and IT management and guidance is given on how this joint responsibility can be exercised.

Document Length: 33 pages

CRITICAL INVESTMENTS

Information technology (IT) infrastructure investments are a major business challenge. These large, long-term investments account for over 58% of the total IT budget of large firms, about 4% of revenues, and have been increasing at a rate of 11% per annum.[1] The process of making decisions about these critical investments are amongst the most contentious and least understood in firms.

IT infrastructure capabilities underpin the competitive positioning of business initiatives such as improved cycle time, implementation of redesigned cross-functional processes, utilising cross-selling opportunities and capturing the channel to the customer. They provide the base for computer applications to execute business processes. But how do Boards judge such business cases for IT infrastructure investments? Where is the chain of evidence, for example, linking investments in an improved communication network and reduced cycle time, or between shared databases, transaction processing and cross-selling? Too often decisions are made on technical criteria, rather than in the context of long-term business needs. At the same time there are competing demands to show business benefits in much shorter time frames.

The questions below highlight why IT infrastructure is a strategic issue and why it is of concern to executive management. Firms are taking different views of IT infrastructure and making different decisions based on their strategic contexts:

- Why is Johnson & Johnson investing in shared IT services across previously autonomous businesses?

- Why have Hong Kong based conglomerates Jardine Matheson and Hutchison Whampoa decided to make no firm-wide investments in IT infrastructure services?

- Why is Citibank Asia centralising and standardising all back room IT processes into the one location for its Asian country operations?

- How has Honda Motor Corporation developed its sophisticated communications networks to reduce cycle time in new car production for the US market?

- Why does the Australian-headquartered international paper and packaging manufacturer, Amcor Ltd, have no firm-wide IT infrastructure services?

Can each of these firms have taken the right decisions? How did these firms come to these decisions? How can business executives identify the best choices for their businesses?

IT infrastructure investments are a strategic issue of concern to executive management, but there has been little guidance on how to make these decisions. In this paper we describe how executives can identify and articulate the IT infrastructure services suited to their business in terms that both the business and IT managers understand.

We draw on extensive qualitative and quantitative analysis of over 50 multi-divisional firms in the financial services, manufacturing, petroleum, retail and telecommunications industries.[2] In over 200 on-site interviews, senior business and IT executives shared with us their strategy, planning and decision-making processes, data about their IT infrastructure investments and the services delivered from those investments. We prepared case vignettes for each firm which were checked for accuracy of data and interpretation by the executives. In 27 of the firms we were able to collect extensive data for the past five years covering different types of IT investments, the performance of those investments, and financial and operational firm and business performance measures. After analysing and synthesising both the qualitative and quantitative data, we identified the different approaches to the IT infrastructure decision making processes of the firms. We developed and implemented a workshop approach involving groups of senior business and IT executives and managers to identify the IT infrastructure implications of the firm's strategizing and planning[3] to understand how firms can make sensible IT infrastructure decisions.

We first discuss the nature and components of IT infrastructure, then explore the framework which has emerged from the best practice of the firms we have studied and show how firms can make informed IT infrastructure decisions.

INFORMATION TECHNOLOGY INFRASTRUCTURE COMPONENTS

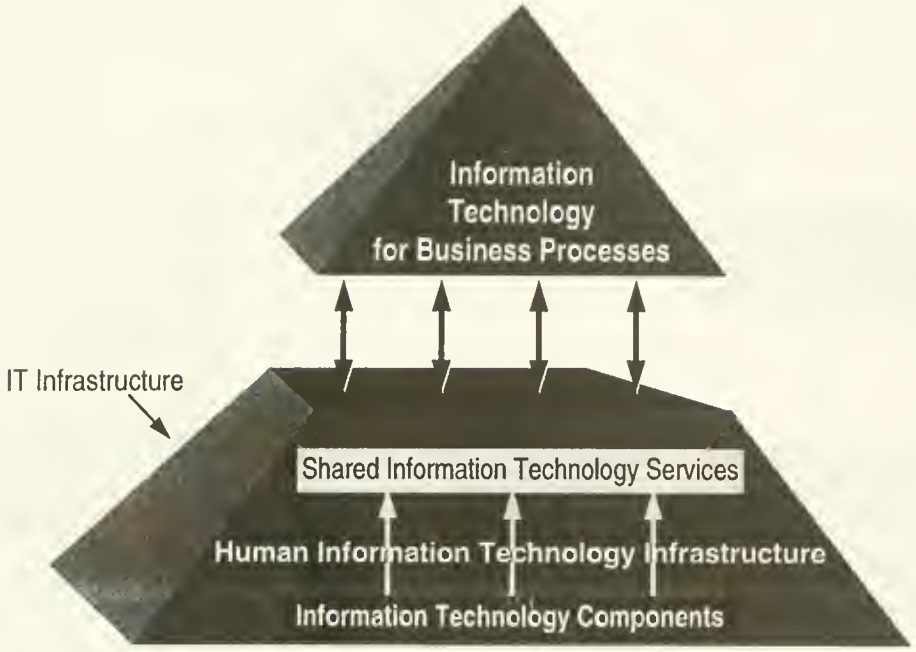
IT infrastructure provides the base foundation of IT capability used to build business applications and is usually managed by the Information Systems (IS) Group. The components of IT infrastructure are depicted in Figure 1.[4] At the base are the IT components, such as computer and communications technologies, which are now largely commodities and readily available in the marketplace. The second layer comprises a set of shared services such as management of large scale data processing, provision of electronic data interchange (EDI) capability, or management of firm-wide databases. The base level components are converted into useful IT infrastructure services by human IT infrastructure composed of knowledge, skills and experience. This human infrastructure binds the IT components into a reliable set of shared IT infrastructure services.

The IT investment which uses, and sits on top of, the infrastructure are the applications, such as order entry, bank account opening, sales analysis and purchasing systems, that actually perform the business processes.

The challenge for firms is to know which infrastructure services are appropriate for their strategic context. What applications might they want to develop? What should be implemented as firm-wide infrastructure services and what should be left to the business units? How much should we spend on infrastructure, compared to our competitors? How does lack of appropriate infrastructure hinder our competitive positioning?

While firms today have many options for configuring their information technology investments, these options have not made the choices any easier or more obvious. Managers now generally accept that they must take some responsibility for their IT choices and not abdicate to

Figure 1: The Elements of IT Infrastructure



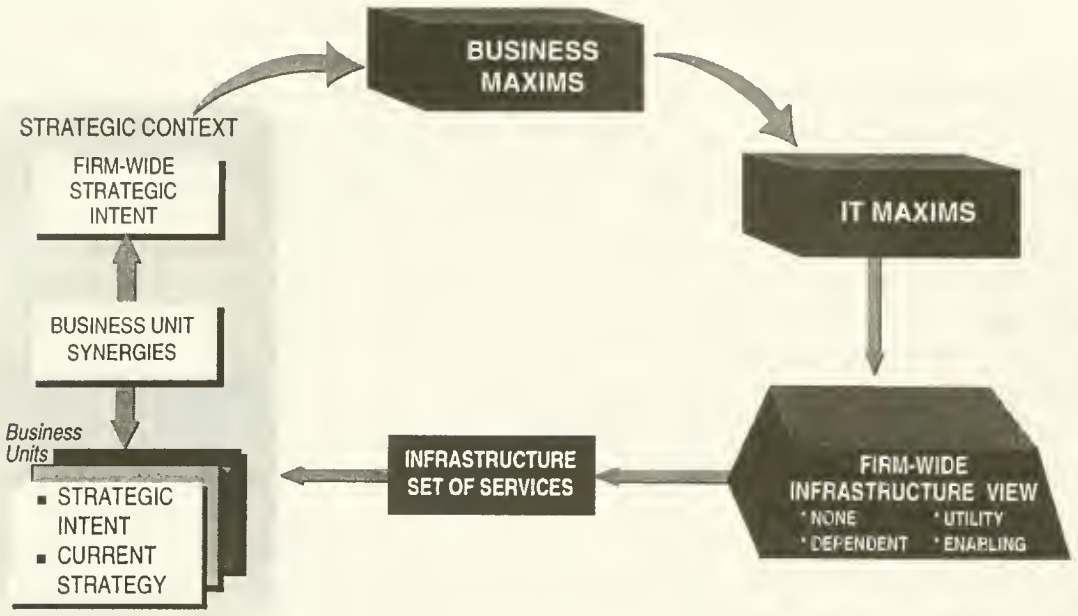
IT managers. But the decision-making process is often convoluted and the range of possibilities is unclear and presented in technical terms. When a large IT expenditure is authorised, managers are still not sure what they have consented to or what capabilities will be delivered to support their business. These dilemmas are particularly pronounced when companies decide on IT infrastructure investments which are long term in nature. Typical management questions that relate to IT infrastructure are: Is it important for all parts of the firm to keep their information about customers in a standardised format? Do the businesses share some of the same customers? Are there opportunities for cross-selling? Do you need to know the total relationship a customer has with your firm? Are there opportunities for economies of scale?

MAKING IT INFRASTRUCTURE DECISIONS

We have distilled how successful firms have made their IT infrastructure investment decisions into the framework we call Management by Maxim. These decisions range from having no infrastructure services at all across the firm through to an extensive set of firm-wide services available to the extended enterprise including all business units, suppliers and customers. The essence and challenge of making the investment decision is to choose the information technology infrastructure services that will readily enable the family of applications required in the future.

The framework is depicted in Figure 2 which presents a basis for decision making.

Figure 2: Linking Strategy and Infrastructure



In summary, the framework begins on the left hand side with consideration of the firm wide strategic context, synergies amongst business units and the extent to which the firm wishes to exploit those synergies. A series of strategic statements we have termed business maxims are derived from the strategic context and identify the future concerns of the firm as whole. From these business maxims, business and IT management together identify a series of IT maxims which express the way in which information and data needs to be accessed and used and what technology resources need to be deployed to ensure adequate technical capabilities, integration and standards. The expectations for IT investments are clarified in terms of the balance between short term cost with minimum investment levels, and future options and flexibility which might require an over-investment based on current needs.

The business and IT maxims lead to identification of the firm's predominant view of infrastructure. This view provides a context for decision making about specific infrastructure services to be funded and made available. These infrastructure services provide the human and technical capabilities which then underpin the business capabilities required for competitive positioning of the firm. This approach can be used in reverse to assess the adequacy and flexibility of their current IT infrastructure to see if it might constrain business initiatives.

We now work through each component of the framework and suggest how judicious IT infrastructure decisions can be made based on the strategic positioning of the company .

CONSIDERING STRATEGIC CONTEXT

The recent experiences of two firms illustrates the changing business demands, roles and relationships which are critical inputs to infrastructure decision making.

"Success and survival are based on anticipation, not on hanging on the past"[5] says Bob Shapiro, CEO of Monsanto, the US-headquartered manufacturing company in the agriculture, performance chemicals, pharmaceuticals and food ingredients businesses. When asked what Monsanto would look like as a business in twenty years Shapiro explained: *"What Monsanto is going to look like depends on what the world is going to look like, and I don't know anybody who can tell you that . . . we are operating in a condition of high uncertainty."* This level of uncertainty led to the re-organisation of Monsanto's four operating units into fifteen strategic business units, each with the responsibility to sense its own potential and to chart a destiny for itself. But concurrent with this desire for greater agility, was the focus on shared business services, including IT infrastructure services, operating alongside the fifteen businesses to create greater efficiencies across the organization as a whole.

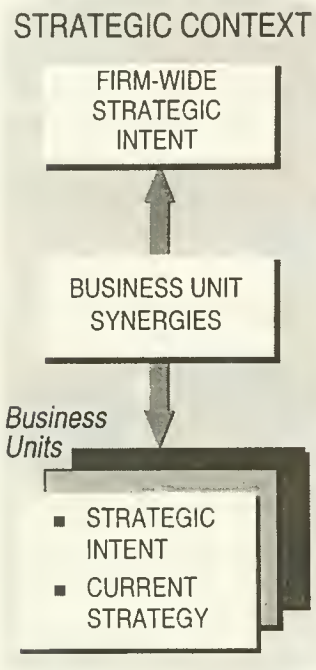
Many telecommunications and utility groups have undergone radical change in the past five years. In 1992, Australia's telecommunications provider, Telstra,[6] lost its monopoly position to a duopoly with Optus Communications, prior to complete deregulation in 1997. The industry is in transition and the situation is summarised by Telstra's CEO: *"Rapidly developing new technologies, new markets, fierce competition and higher customer expectations are combining to generate change on a scale never experienced in the Australian telecommunications industry. The changes we have made deal with the very structure of our organization and with all of our systems: management, financial, operating and product/service development."*[7] Telstra's competitive situation has changed dramatically, customers now have a choice, and this has led to a new set of business imperatives, emphasising customer service and value. This emphasis in turn demanded that formerly separate business units with disparate customer and operational systems, reconsider the nature of customer information and the billing system, and how this could be consolidated to create a customer-focused business with a single point of contact.

Firms such as Amcor, Citibank, Honda, Johnson & Johnson, Monsanto and Telstra have different long-term strategic intents.[8] The expression of these intents give us only a few broad clues for deciding on an approach to IT infrastructure services. They also do not tell us about the businesses that make up the firm. To clarify infrastructure requirements, we need to understand the current strategies and strategic intents of each of the business units, the extent of business synergies between business units and the firm's experiences and beliefs in the value of leveraging these synergies. Figure 3 summarises key inputs from strategic context as a basis for determining what infrastructure services should be developed across a firm.

A high level of customer overlap provides opportunities to cross-sell products and implies the need for common customer profiles and databases. Where there is a high degree of overlap in suppliers, synergies could be derived from a co-ordinated approach to electronic data interchange (EDI) and extended enterprise systems, and cost reductions from suppliers. Product similarities indicate that many types of expertise could be shared: R&D, manufacturing and production, maintenance and after-sales service. Similar ways of competing might result in similar

management approaches and consequent needs for shared information and information systems. Finally, many firms have a strong corporate desires to exploit shared services, to achieve economies of scale or scope or expertise in areas such as financial management, human resources management or information systems.

Figure 3: Key Components of Strategic Context



Firm-Wide Strategic Intent

- Long term goals of the firm

Potential Business Unit Synergies

The extent of:

- Overlapping customer and supplier bases
- Product similarity amongst the BUs
- Expertise that can be leveraged across the firm
- Predominance of one value discipline amongst the BUs
- Similarity in basis of competition amongst the business units, e.g. do they all compete on costs; or is there considerable variation with some competing on cost and others on value-added service or high quality niche products; or a shared capability might be integral to the competitiveness of each business

Individual Business Unit Attributes

- Strategic intent: long term goals of each business unit
- Current Strategies of each business unit, competitive choices

Synergy vs Autonomy Focus

- Desire for exploiting synergies vs encouraging autonomy

Analysing the strategic context of Amcor and Honda we investigate why firms develop different approaches to infrastructure services.

The US$5.2 billion paper and packaging company, Amcor Ltd. has moved in stages from paper making to packaging, to corrugated boxes, and then to plastic containers and cans.[9] As the CEO describes it: *"We now have a very decentralised and very individual set of businesses - each with their own subculture. The overall control mechanism for the Group is based around return on assets."*[10] While there is some vertical integration in Australia and the United States where the paper group's mills supply some of Amcor Fibre Packaging's (AFP) box factories, generally the businesses do not share customers or products. The emphasis on operational autonomy is echoed in the words of AFP's managing director: *"We have a strong focus on local accountability and prefer to run the business with the minimum of mandates."*[11] AFP has a multinational orientation focused on building strong, resourceful and entrepreneurial national and regional operations.

Honda, on the other hand, has a transnational orientation and sees its businesses as *"a global network with 83 production facilities in 39 countries that supply Honda products to approximately 160 countries."*[12] "Product realisation" is a capability central to Honda's competitiveness in each of its businesses[13] and there is synergy in the competencies required to

make motor cycles and automobiles. An efficient parts system for all products is seen as part of the backbone of the business. Honda's communication network is aimed at both cutting costs and enabling electronic communication to speed the business. Honda's Systems Division General Manager recalled the justification for the enhanced network: *"Each business and IS group saw the benefits as we did and the divisions agreed to share the cost. It then became part of the business plan for each business and region."*[14] In Honda, there is a clear desire and capacity to exploit the potential of the synergies that exist amongst the different businesses.

The attributes of a firm's long-term and business unit strategies, together with identification of the implications of business unit synergies often are not well synthesised in a form which is accessible outside the executive team. Yet this information provides critical input to formulating what should be shared across the firm and what should be devolved to business units or process owners and leads to the second step in linking strategy and infrastructure services.

ARTICULATING BUSINESS MAXIMS

Consideration of a firm's strategic context provides insights about what should be co-ordinated across the firm, what can be leveraged from within business units, and what can be left to local options. We have found a useful way to express this synthesis is in a series of short statements expressing the shared focus of the business in actionable business terms. We refer to these statements as business maxims, drawing on Aristotle's depiction of maxims as statements which indicate a practical course of conduct to be chosen.[15]

Business maxims draw on the firm's strategizing, and output from the strategy formation process, such as mission statements and statements of strategic thrusts. These provide the grounding and factual base referred to by Aristotle, from which maxims can be deduced. The purpose of maxims is to articulate an agreed position in a form which can be readily understood and acted upon.

We suggest that business maxims be developed through a joint business and IT management workshop — as outlined later in this paper — to overcome one of two problems we have found in many firms: first, some firms do not have strategic statements with the qualities of sharpness and comprehensiveness necessary,[16] or, they have an excess of documentation which is not sufficiently focused and readily actionable. Firm-specific business maxims translate aspects of strategic context into terms which can be easily communicated across the firm.

An example of a business maxim in an insurance firm with three business units is that *"all sales employees are decision makers about taking new policies and cross selling."* This maxim implies that the firm's infrastructure needs to provide access for all employees (regardless of location) to the data and systems required to make insurance policy decisions. This was one of five business maxims, which, taken together, provide a strong and concise statement of the business requirements at the firm-wide level.

Business maxims focus the attention of all employees on simple and achievable messages, whether or not they are part of the strategy making process. Business maxims express one or more of:

1. The competitive stance of the firm in a clear and actionable message.

2. The extent to which the firm co-ordinates the business units (e.g., autonomy of business units, or cross-selling, synergies and sharing of resources).

3. The implications for the management of information and information technology.

Changes in the competitive environment of a firm requires reshaping of business maxims. RACV is a membership based provider of vehicle insurance, roadside and other services in the state of Victoria, Australia. RACV has a membership base for roadside service covering just on 60% of Victorian drivers and faced little competition till a few years ago. The equivalent organization in a neighbouring state then extended its base into Victoria resulting in an intensely competitive situation. The RACV has now developed a strong focus on membership acquisition and customer needs, together with innovative product and services.[17] New business maxims have raised the criticality of cross-selling and increased the urgency for sharing customer databases and transaction processing systems across the businesses.

Business maxims derived from the firm-wide strategic contexts of Amcor, Honda and RACV are listed in Figure 4. These sets of maxims show differences in emphasis which have implications for different business and IT infrastructures. Amcor has strong pressures for local responsiveness in its businesses and emphasises local accountability with a minimum of mandates. Honda seeks to expedite global operations through maximising the synergies of production and operations in many countries while concurrently focusing on greater localisation. Honda refers to this approach as *"glocalization"* where there is a need for greater localisation, particularly in styling, but in the context of sharing expertise in a firm committed to globalization of its operations.

Innovation is now viewed as critical to the future success of the RACV both in its mission to expand the membership base and in the future survival and growth of its critical revenue earner, insurance. The RACV seeks to remain a low cost provider, but is being forced to view its function and role in new ways and is acquiring complementary businesses to assist in the development of new products and services. Cross-selling to the membership base is now a strategic focus.

We have identified business maxims which refer to many different aspects of the business. Figure 5 provides examples of maxims in six categories: cost focused, value-differentiation as perceived by customers, flexibility and agility, growth, human resources, and management orientation. We have found that five or six maxims are the most that can be communicated by executive management and well understood by operational managers. Thus management needs to prioritize the relative importance of maxims to ensure a set of maxims which captures the most important messages.

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Figure 4: Maxims from Firms

AMCOR

- Provide products and services of the highest quality and lowest price
- International expansion through creation and acquisition of new businesses
- Diversification into all areas of the paper and packaging business
- Optimise returns on shareholders funds by focusing on core activities
- Local responsibility and accountability with a minimum of mandates

HONDA

- Continuous innovation through creating and developing new products, and adapting products for major regionall markets
- Expediting global operations through maximising the synergies of production and operations in many countries
- Continuing focus on reducing cycle time from R&D through production and marketing
- Flexibility to respond to new opportunities and create new markets
- Staff of the highest calibre who excel in working together
- Commitment to minimise costs where possible

RACV

- Differentiation via product innovation
- Highest possible one-stop service standards from a low cost base
- Customer needs driven product and service development
- Growth in membership and services cross-selling
- Sustaining and developing member and staff loyalty

Business maxims provide an informed base from which business and IT executives can work together to identify IT maxims. This can also work in other areas, such as financial management and human resources, to generate financial and human resource management maxims.

Figure 5: Sample Business Maxims

COST FOCUSED

- Lowest cost pricing of our products/services
- Drive economies of scale through shared best practice

VALUE-DIFFERENTIATION AS PERCEIVED BY CUSTOMER

- Meet client expectations for quality at reasonable cost
- Make the customer's product selection as easy as possible
- Provide all the information needed to service any client from one service point
- Capture the electronic delivery channel to the customer
- Strong relationship management with superior customer service
- Client service which helps customers reach their potential
- Developing customer partnerships based on long term relationships
- Developing customer partnerships on a worldwide basis
- Know what is selling and where it is selling
- Develop win/win relationship with key suppliers

FLEXIBILITY AND AGILITY

- Flexibility to respond to new markets
- Growth in cross-selling capabilities
- Rapid development of new products and services
- Fastest time to market with new products and services
- Ability to detect and respond to subtle shifts in the marketplace
- Continuous innovation through new product development
- Capacity to manufacture in any location for a particular order
- Ability to deploy resources for new products quickly and judiciously

GROWTH

- Aggressive expansion into underdeveloped and emerging markets
- International reach and presence as one business
- Careful growth internationally to meet the needs of customer who are expanding
- Targeted growth through specific product and customer niches
- Leverage international growth from a domestic base

HUMAN RESOURCES

- Create an environment which maximises intellectual productivity
- Maintain a high level of professional and technical expertise
- Identify and facilitate the movement of talented people
- Attract and retain high calibre staff committed to our vision of the one corporation

MANAGEMENT ORIENTATION

- Maximise independence in local operations with a minimum of mandates
- Make management decisions close to the line
- Leverage the synergies from throughout the firm
- Management culture of information sharing [to maintain or generate new business]
- Flexibility in operating style to make decisions [for customers] quickly

IDENTIFYING IT MAXIMS

Information Technology maxims are statements which decree how the firm needs to connect, share and structure information[18] and deploy information technology across the firm.[19] IT maxims identify the ways in which the firm needs to:

1. Lead or follow in the deployment of IT its industry (e.g., leader, fast follower, or user of standardised applications).

2. Electronically process transactions.

3. Connect and share data sources across different parts of the firm.

4. Connect and share data sources across the extended enterprise (e.g., customers, suppliers, regulators, strategic alliances).

IT maxims contain references to the firm's approach to:

- the role of IT and levels of investment relative to competitors;

- transaction processing: standardisation, common interfaces, tailoring to local needs;

- access, use, and standardisation of different types of data (e.g., financial, product, customer).

Figure 6 contains samples of generically phrased IT maxims synthesised from our work and the IT strategic statements of some firms. These are grouped under five headings: expectations for IT investments in the firm; data access and use; hardware and software resources; communications capabilities and services; and architecture and standards approach.[20] The number of maxims will vary amongst firms, depending on the breadth and depth of implications drawn from the firm's business maxims.

We provide below some specific examples of IT maxims from firms in different industries:

- *Summary information for production, sales, marketing, distribution and financial management should be readily available to managers in a form which is timely, consistent, integrated, easy to use and useable in making business decisions.*
  — A growing firm in the beverage business

- *Common interfaces and back room processing will be used for ATMs across the five countries in which the bank operates.*
  — An Asian-headquartered bank which is expanding its operations

Figure 6: Sample IT Maxims

EXPECTATIONS FOR IT INVESTMENTS IN THE FIRM

- We use IT to reduce costs through eliminating duplication of effort
- We seek to achieve cost reductions through more efficient and effective use of IT resources
- Our IT spend must meet defined business needs and show clear cost savings
- IT expenditure must improve customer service levels
- IT investments are aimed at enabling the introduction of new businesses
- IT is viewed as a service provider focused on satisfying end-user requirements
- IT is used to meet local needs in business units
- IT has a strategic role in achieving our firm objectives, rather than just a vehicle for cost displacement
- We compete with IT and our services and products are dependent on continuing investment in leading edge business technology
- We develop innovative business and marketing applications of leading edge (but stable) technologies
- Our business is about creating new products/services using IT

DATA ACCESS AND USE

- The usefulness of data must be recognised beyond the area immediately responsible for its capture, so it is not lost
- Centralised information flow should allow all parts of the firm to more easily and quickly spot trends and use these to the firm's advantage
- Business processes and systems must ensure that financial and sales data are captured and maintained together
- We need to have a common view of the customer across our businesses
- Core databases should provide shared access to key business information
- There must be a competing business reason to justify access to information about customers/products across our business
- Mobile users must have ready access to the same data they have at the desktop
- Managers must be have quick access to financial data across the firm
- Customer service reps. must be empowered with access to a complete file of the customer's relationship with the firm
- R&D staff in different parts of the world need ready access to each other to communicate their ideas and exchange design concepts

HARDWARE AND SOFTWARE RESOURCES

- We will migrate towards hardware and software resources that can process complex transactions across global reach
- We will focus on speed of transaction processing by reengineering and automating core business processes
- We will move towards electronic processing of repetitive transactions
- Desktop IT must provide all managers and staff with user-transparent applications to empower them to perform complex tasks quickly
- Our core applications need to be integrated, and major hardware platforms compatible
- We will have a common order entry systems across business units who can cross-sell
- Our computing resources should offer scalable, multi-application, cross-platform solutions
- We need to bridge different technical platforms and allow functions and data to be shared between applications
- New systems will provide a foundation upon which new services can be added without major modifications
- We develop common systems in those parts of the firm where there is a strong business case
- Common systems development is not consistent with the governance of the firm. Thus IT solutions should be shared on an informal basis

COMMUNICATION CAPABILITIES & SERVICES

- Our corporate network must provide access to a wide range of applications essential to the delivery of consistent customer service
- Our corporate network must be capable of carrying high bandwidth applications such as imaging and videoconferencing
- We require maximum penetration in the use of EDI and related technologies to streamline business processes
- We need to integrate access to Internet with our communications network
- We will maximise the level of our electronic messaging systems for communications and transaction processing
- Our external communications are seen as providing future channels to our customers particularly for electronic commerce and service delivery

ARCHITECTURE AND STANDARDS APPROACH

- We have a recommended IT architecture covering hardware, software and connectivity requirements
- We have an agreed firm-wide IT architecture approach covering data, hardware, software and communications
- An IT architecture approach is not necessary due to the lack of synergies amongst businesses
- We need to take a firm-wide approach to data management as a basis for future information sharing
- We require data standardisation for financial and sales data only
- Enforcing data standardisation would be contrary to the autonomy of business units
- We enforce standards for hardware and software selection to streamline resource requirements and reduce incompatibilities and costs
- We will maintain short lists of supported products and favoured vendors in each technology category. Users may purchase other products, but IT will not support them
- We will coordinate purchasing of IT from major vendors centrally to minimise costs, ensure consistency and coordinate expertise
- We do not use standards for hardware and software selection in the firm
- We select the best application to suit the specific business situation

- *Our corporate network must be capable of carrying high bandwidth applications such as imaging and videoconferencing.*
  — A manufacturing firm with both headquarters and distributed R&D groups and a strong focus on product innovation

- *Selected enterprise-wide relevant data must be in a consistent form which facilitates aggregation on a world-wide basis. This data is to enable global management of customers (A/R, Credit), suppliers (A/P), provide knowledge of suppliers who are customers and vice versa, global management of materials, and general finance.*
  — A multi-business international manufacturing firm

The last example above is from a firm we will call WorldCo where the new CEO has set the context for a different balance between corporate and business unit operations with these words: *"Each business has its own strategic needs that must be served while sharing information at an enterprise-wide level. Differences among business units that contribute meaningfully to business results are appropriate; differences that don't are not. IT, in the context of business redesign, is the single most valuable tool to allow us to become more effective in the marketplace."* WorldCo has now identified what data needs common systems to be managed across the firm and which does not.

WorldCo's maxims in the areas of technology resources are expressed as follows:

- *Our network must enable business units to access selected applications essential to the firm's shared business objectives.*

- *The network must provide, as a minimum, electronic mail facilities for communication amongst business groups internationally, and support the ongoing implementation and use of groupware products.*

- *Communication systems must facilitate high quality person-to-person interaction amongst R&D staff and between R&D, production and marketing personnel.*

- *We have an agreed IT standards for those parts of the IT infrastructure which support shared services. This architecture includes that required to manage knowledge for enterprise decision support.*

- *We enforce some standards for hardware and software selection to streamline resource requirements and reduce incompatibilities and costs.*

- *Provided they meet certain data requirements and selected standards, business units can determine the most appropriate applications for their businesses.*

By way of contrast, Amcor's multinational approach to its operations and business maxims emphasising a minimum of mandates leads to an IT maxim such as *"IT expertise and technological solutions are shared on an informal basis,"* implying no investment in firm-wide

IT infrastructure. This IT maxim is consistent with the firm's strategic context and approach to forgo IT-related synergies.

These two examples of multi-business manufacturing firms lead to different views of IT infrastructure and different sets infrastructure services.

CLARIFYING THE FIRM'S VIEW OF IT INFRASTRUCTURE

We have observed four views of IT infrastructure in firms: none, utility, dependent and enabling.[21] These views have different benefit expectations and investment profiles. Upfront investments and the number and depth of IT infrastructure services increases from no firm-wide infrastructure to an enabling view. The primary value drivers of the views are summarised in Figure 7. None of these views is superior, but one view is usually more appropriate than another in light of the firm's strategic context, business and IT maxims.

Figure 7: Infrastructure Types and IT Drivers

View of Infrastructure	Primary Value Driver
NONE	Forgo Economics of Scale
UTILITY	Cost savings via economies of scale
DEPENDENT	Business benefits for the life of the current strategy
ENABLING	Current and future flexibility

Where a firm decides to forgo synergies or IT economies amongst its businesses then it does not invest in infrastructure services at the firm-wide level. This does not, though, preclude informal interaction amongst the firm's different IT groups amongst each of its businesses. It might choose, too, to invest in shared services at the business unit level.

A utility view of infrastructure implies that expenditure on IT infrastructure is seen primarily as a way of reducing costs through economies of scale. IT is viewed as a utility that provides a necessary and unavoidable service which incurs administrative expenses. The management thrust is to minimise the expense for a desired level of service. We identified a number of process manufacturing firms who took a utility view where there was some synergy amongst the business units. In these firms maximising return on assets was an important strategic emphasis with minimising costs a high priority business maxim.

A dependent view of infrastructure implies infrastructure investments are primarily in response to specific, known current strategies. Dependent infrastructure investments are derived from business plans that specify or imply information and IT needs. Honda's infrastructure

investments are consistent with a dependent view. The firm's transnational orientation, the policy of *glocalization*, and expediting global operations through maximising synergies has resulted in IT maxims which emphasise the communication requirements of R&D staff, the capability to transfer sophisticated design concepts, data and documentation between major centres in Japan and the USA, and standards and capability to manage selected data (sales, finance, parts) globally. Honda has implemented infrastructure services based on the needs of their strategic context.

An enabling view of infrastructure implies an over-investment in IT infrastructure — in terms of current needs. The purpose is to provide flexibility to achieve the firm's long-term goals and to enable the quick development of new products. Enabling infrastructures are often created by expanding a dependent infrastructure beyond the current requirements of the business. To take and financially justify an enabling view, senior managers must perceive a flexible infrastructure as an asset of the firm providing competitive advantage.

The telecommunications services provider Telstra took an enabling view of infrastructure in the early to mid 1990s in line with the corporation's drive for business growth through the development of new markets in Australia and internationally. The first step was the implementation of an Overall Systems Architecture (OSA) to provide the basis for integrating business processes across multiple business units. The OSA provided the building blocks of IT capability to be fully exploited in the introduction of new products, processes and work practices. *"What we ended up with,"* explained the CIO, *"is an amazing corporate asset. We have the most standard corporate desktop in the world in terms of user numbers (over 40,000 PCs and terminals in use), probably the third or fourth largest electronic mail network in the world, and two large networks taking over from twenty or thirty competing wide area networks that had built up over the years."* Telstra now has the information and functionality required to service customer needs immediately at the customer service point. New products are being introduced much more quickly and easily than would ever have been possible with the previous approach to infrastructure.

Based on our empirical work in 27 firms,[22] we have identified the typical characteristics of investments and capability for each of the four views of infrastructure (Figure 8). The words in the body of the table describe what is typical of each cell while the figures in brackets are the average of the 27 firms. For example, during our study, 23 infrastructure services were provided by firms (see Figure 9 for a complete list) and the average firm with a utility view had 13 services, while firms with an enabling view averaged 20. Firms with a utility view invested a significantly lower percentage (37%) of their total information technology in firm-wide infrastructure when compared to firms with an enabling view (50%).

Our empirical data collection and analysis revealed that the five characteristics of view of infrastructure all covaried. Thus firms that spent more on information technology infrastructure had more services, focused on flexibility during the justification process, and had more extensive services.

Figure 8: Four Infrastructure Views: Investment and Capability Characteristics

Characteristics of Firm Wide Infrastructure	None	Utility	Dependent	Enabling
IT as a % of Expenses Relative to competitors	Lowest	Low	Just below average	Highest
Firm-wide IT Infrastructure as a % of Total	Lowest (0%)	Low (37%)	Just above average (45%)	Highest (50%)
Approach to Justification	Never supported	Cost saving	Balance flexibility and cost saving	Flexibility
Infrastructure Services	None	Basic services (average of 13)	Basic services plus strategic services (average of 16)	Extensive infrastructure services (average of 20)

In summary, a firm taking an enabling view will lead their industry in infrastructure investment levels and provide extensive infrastructure services in a highly centralised way. Firms with an enabling view will also focus primarily on strategic flexibility in the justification process. In contrast, firms taking a utility view will have lower than average firm-wide IT infrastructure investment and provide basic infrastructure services centrally. Firms with a utility view will primarily take a cost reduction focus during the justification process.

Firms with a dependent view will attempt to balance cost and flexibility in the justification process which results in an average investment in IT infrastructure for their industry. Firms with a dependent view provide the basic infrastructure services centrally plus several that are key to their strategic objectives, such as a shared customer database.

The firm's view of infrastructure should change with changes in strategic context and business maxims. Prior to the advent of interstate competition, RACV took a utility view of its IT infrastructure investments, driven by constant cost reduction. The result was that when RACV's business situation changed, the firm's customer database did not have the functionality or flexibility to support the business maxims of one-stop service standards and cross-selling. RACV is now taking an enabling view of infrastructure and is investing substantially to upgrade its technology infrastructure and extend its infrastructure services.

IT maxims and view of infrastructure provide the basis for the firm's decisions on the extent and level of infrastructure services to be provided.

DECIDING ON INFRASTRUCTURE SERVICES

What types of firm-wide services are provided by investments in firm-wide IT infrastructure? We have identified a total of 23 infrastructure services in the firms we have investigated. These are

listed in a generic form in Figure 9. The first five of the services were offered in some form in the firms we investigated that had firm-wide infrastructure.

Figure 9: Infrastructure Services

5 CORE IT INFRASTRUCTURE SERVICES	
1.	Management of corporate communication network services
2.	Management of group-wide or firm-wide messaging services
3.	Recommend standards for at least one component of IT architecture (e.g., hardware, operating systems, data, communication)
4.	Security, disaster planning and business recovery services for firm-wide installations & applications
5.	Technology advice and support services
18 ADDITIONAL IT INFRASTRUCTURE SERVICES	
6.	Management, maintenance, support of large scale data processing facilities (e.g., mainframe operations)
7.	Management of group-wide or firm-wide applications and databases
8.	Performing IS project management
9.	Data management advice and consultancy services
10.	Enforcement of IT architecture and standards
11.	Management of business unit-specific networks (e.g., LANs)
12.	Identification and testing of new technologies for business purposes
13.	Managing and negotiating with suppliers and outsourcers
14.	Development of business unit-specific applications (usually on a chargeback or contractual basis)
15.	Implementation of security, disaster planning and recovery for business units
16.	Electronic provision of management information (e.g., EIS)
17.	Group-wide or firm-wide data management, including standards
18.	Management of business unit-specific applications
19.	Development and management of online and/or EDI linkages to suppliers, customers
20.	Development of a common systems development environment
21.	Providing IS planning for business units
22.	Technology education services (e.g., training)
23.	Multi-media operations and development (Video-conferencing)

The way in which the basic services are offered and utilised varies between firms and is usually related to the firm's view of the role of IT infrastructure. For example, the most common infrastructure service is the management of the corporate communications network. The network tends to become increasingly important for firms with a dependent or enabling view of IT infrastructure. Currently, firms with a utility infrastructure view often use the network more for electronic messaging rather than as part of inter- or intra-organisational systems for executing business processes. In firms with an enabling view, such networks are used extensively for business transactions and business processes both within and between firms and their customers and suppliers.

We provide an example of firm-wide infrastructure services for Telstra, which has a high degree of synergy amongst its businesses and an enabling view of infrastructure:

- Management, maintenance and support of all large scale data processing facilities.
- Management of communication network services encompassing email, transaction traffic, file transfer, imaging, video and remote access to mainframe resources regardless of the technical platform or geographic location.
- Management of firm-wide databases and applications.
- Management of firm-wide messaging services.

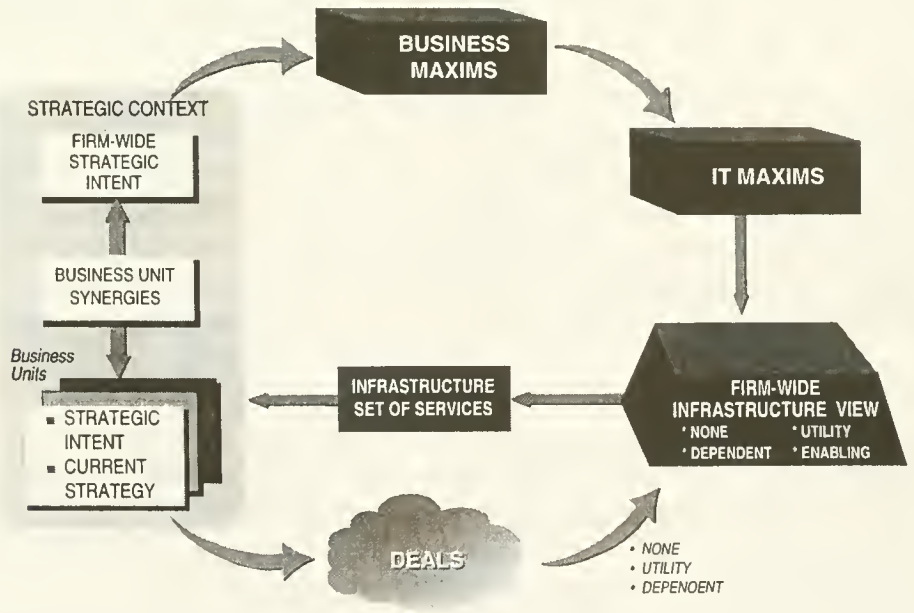
These infrastructure services provide the capability to ensure that all the information needed to service any customer will be available at any one service point. This supports another business maxim for Telstra, that of *"first choice among customers with Telecommunications needs."*

We now complete the picture of how firms create business-driven IT infrastructures.

MAXIMS AND DEALS

While we have focused so far on the Management by Maxims approach, in fact we identified two approaches taken by firms in developing strategically appropriate firm-wide infrastructure services. The second approach is Management by Deals and both are represented in Figure 10.

Figure 10: Linking Strategy and Infrastructures: Maxims and Deals



The Maxims Route

Management by maxims can be seen in the approach taken by the large health products provider, Johnson & Johnson (See Figure 11). J&J's firm-wide business maxims have changed in the past two years to respond to changes in the health care industry. The firm's desire to leverage its strength with the changing customer base in the health industry resulted in the business maxim to develop partnerships with large customers across its businesses.[23] It was now desirable to identify some large customers who were dealing separately with different autonomous business units. This has changed the amount and kinds of information that need to be communicated and shared across J&J operating companies world-wide. From these developments we derived a set of IT maxims which express the business need to access aggregated data in common systems, deliver customer profiles, reduce duplication of effort, develop shared services as a foundation for common systems, and communication systems which foster person-to-person interaction. J&J has taken a dependent view of infrastructure and developed a specific set of infrastructure services to provide the capabilities required of its business maxims.

If a firm takes the maxims route any one of the four views of infrastructure can result and any one of the these might be appropriate depending on the strategic context and maxims of the firm.

The Deal Route

The maxims route assumes that both business and IT management are able and willing to take a firm-wide view. We found that this situation exists in about half the firms we studied. The other half engage in a deal making process which focuses on the more immediate needs of each of the businesses. In this situation, IT managers talk with business unit managers, often as part of an annual planning cycle. The aim is to understand the business units' IT needs based on current business strategies. After making the rounds of all the business units, IT managers make firm-wide infrastructure recommendations based on a combination of the business unit needs. Cost are estimated and the IT manager goes back to each business unit with a proposal. Negotiations follow, trading cost versus infrastructure services, and a deal is struck.

In firms which take a deal making route we observed that one of three views of infrastructure emerges: none, utility or dependent. We have not observed any firm take an enabling view of infrastructure via the deal process and few with a dependent view. An enabling view is prevented by the pressure on costs and dominance in the deal process of current strategies versus long-term strategic intents. This pressure prevents valuing the flexibility inherent in an enabling view of infrastructure. Our observations suggest that it takes business maxims set by corporate executive management to have the political weight to justify enabling firm-wide infrastructure with extensive infrastructure services.

The deal making process is the free market of IT infrastructure formation. The free market often means that powerful, successful and rich business units are far better served by the IT infrastructures that are put in place. Small, but growing, business units often complain about the lack of suitable infrastructure provided by IT management. These small business units tend to build their own business unit infrastructures which are tailored to specific needs. This approach is recommended where there are no business imperatives to exchange or access data, or do

Figure 11: Johnson and Johnsons's Strategic Context and Infrastructure Services

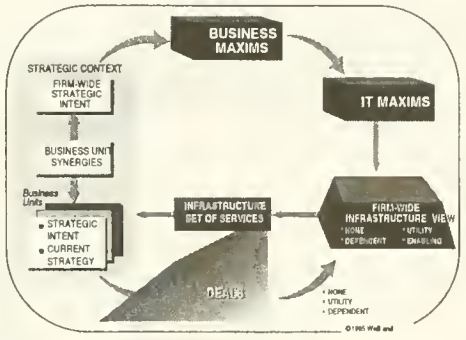
JOHNSON & JOHNSON

BU Maxims Example: Consumer Business in Region

- Responds to subtle shifts in market needs
- Maintain brand loyalty from customers
- Quality products linked with a 'well being' image
- Win/win relationship with customer and suppliers

Johnson & Johnson Firm-Business

- Continuous innovation through discovering, developing and acquiring new products
- Production and delivery of high quality products and services
- Develop partnerships with customers on a worldwide basis
- Constant cost reduction
- Increased operating effectiveness



Firm-Wide IT

- Data must be accessible through commor systems to facilitate aggregation
- Centralised information flow should allow all parts of the firm to more easily and quickly spot trends and use these to the firm's advantage
- Data standardisation across all business units is needed to facilitate information sharing and reduce duplication of effort
- IT's role is to leverage the information which resides in the firm for competitive positioning and to reduce costs through eliminating duplication of effort
- The ability to deliver customer profiles to anywhere in the organisation
- Common systems to provide a foundation upon which new shared services can be readily developed
- Communication systems must facilitate person-to-person interaction amongst R&I staff and between R&D, marketing and sales managers
- Information systems must facilitate the monitoring of product and service quality

Johnson & Johnson (Corporate) Synergy:

- Some BU synergies
- Predominant Value Discipline: Product Leadership, but Customer Intimacy very important in some parts of the firm

Johnson & Johnson Firm-Infrastructure View

- Dependent: Specific benefits linked to business strategies

Johnson & Johnson Firm-Wide IT Infrastructure

- Development and management of 'shared services'. These are applications which are standard across the firm worldwide and include financial systems (eg. general ledger), purchasing, order processing, accounts payable, payroll and human resources
- Development of a firm-wide information architecture
- Establishment of selected IT standards to support firm-wide information architecture (eg data and voice telecommunications, electronic mail, document interchange formats, video conferencing)
- Development and deployment of an Executive Support System. The ESS is based on a standard template or shell built with a data warehousing concept
- Management of selected firm-wide IT support services (eg. firm-wide communications network)
- Coordinating the investigation and implementation of emerging technology across the firm
- Assisting in the identification of business opportunities and implementing applications to meet firm-wide business requirements
- Providing executive education to improve awareness of the impact of IT on the business

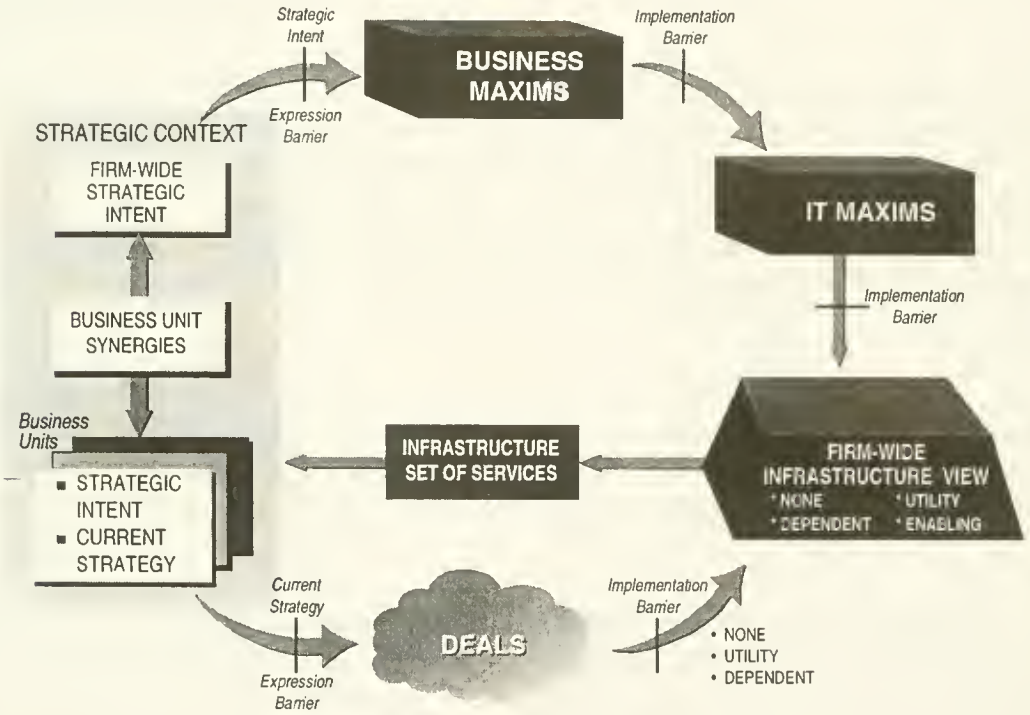
business electronically with other parts of the firm. However, this approach leads to island of automation which are difficult to integrate later if strategic needs change.

In firms with a deal making approach, it was common to observe a utility firm-wide infrastructure with tailored business unit infrastructures taking a dependent or enabling view.

BARRIERS TO CREATING BUSINESS DRIVEN INFRASTRUCTURES

We have observed two major barriers to the formation of IT infrastructures: expression and implementation barriers. The existence of these barriers prevent or retard the recognition and development of appropriate infrastructures for the firm's strategic context (See Figure 12).

Figure 12: Barriers to Creating IT Infrastructure



Expression Barrier

In some firms clear and concise strategic statements have emerged from the firm's visioning and strategy formation processes. In other firms, business maxims might not be explicit but rather implicit and not difficult to surface. An expression barrier exists where sets of maxims are very difficult to locate or articulate. This occurs when there is insufficient understanding and commitment by operational management of the strategic intent of the firm.

Lack of clarity usually has one of three causes:

- Executive management might not have achieved clarity in either the strategic intent or current strategies of the firm.

- Executive management might have such clarity but not articulated and communicated the message successfully to operational management.

- Individual reward systems and the culture of the firm might work against the successful articulation and use of maxims.

While we have observed organisations with expression barriers caused by lack of strategic clarity, this is less common than the inability to communicate, or the existence of non-supportive cultural and reward systems. Such expression barriers mean that those who manage the IT resource might lack the information on the strategic context of the firm which is needed to build an appropriate infrastructure.

The strategic intent expression barrier prevents business maxims being used while at the business unit level, the current strategy expression barrier prevents deals being struck. In cases where both expression barriers exist, one option is for IT managers to forge ahead and build infrastructures. This scenario tends to result in the biggest failures in the development of excessive or inappropriate infrastructures. Instead we would suggest that IT managers use their knowledge of the firm to develop a set of business and IT maxims and use these as a tool for dialogue with executive management.

Implementation Barriers

Implementation barriers occur where there is the will and vision to form the appropriate infrastructure, but the task cannot be completed. There are many possible causes, ranging from organisational, political, cultural and reward system issues through to lack of IT leadership and technical impediments.

Sometimes IT executive management is unable to gain organisational agreement to invest in infrastructures. This is particularly the case for enabling infrastructures where the business benefits are not based on cost reduction. In one rapidly expanding Asian bank which had only recently appointed an IT executive this was the situation. Executive management was inexperienced in considering infrastructure investments. The IT executive explained her approach to overcoming implementation barriers: *"The challenge here is for the business to understand and own the IT investments. Until a year ago, there was no history of infrastructure investments and little co-ordination of IT across the bank. We are now in Stage 1 of an investment and education process. At present I can't sell the concept of infrastructure without it being linked to specific business applications. The result is that we hide the infrastructure costs in business application cases and thus the infrastructure building process has been piecemeal. But it is following a plan. I expect that next year, the executives will have a much greater understanding of the role of infrastructure. We will have some new applications in place and they will see it for themselves. The justification case for infrastructure can be made differently once they see what it delivers to the business."*

Implementation barriers can occur where the business and IT maxims are set in isolation and thus are not related. For example, the push by IT groups to set and enforce firm-wide data and computing standards in the absence of an appropriate business maxim providing the impetus and credibility results in comments like *"here comes the IT police again."*

Implementation barriers can also result from technical constraints of the current infrastructure. Often barriers to increasing the reach and range of infrastructure services stem from proprietary operating systems or lack of standard data definitions across the firm. This type of implementation barrier is common in firms where business units are acquired or where the business need for shared infrastructure, such as for cross-selling between business units, has only recently occurred. In both these situations, the technical decision to form the separate business unit infrastructures were made without the need to consider integration.

In firms we have studied that have created business driven infrastructures, either maxims or deals are evident. Maxims provide a focus and credibility for IT managers as they build infrastructures which are aligned to the strategic context of the firm. Sometimes the elicitation of business maxims makes it clear that these maxims are difficult to implement concurrently. For example, we have seen some firms seeking to minimise costs concurrent with achieving a high degree of future flexibility. But executive management is baulking at the magnitude of initial investment required. Clarification of business maxims can be very useful in prioritizing trade-off situations.

SHARED BUSINESS AND IT MANAGEMENT RESPONSIBILITY

To achieve business driven infrastructure through management by maxim, the development of infrastructure must be seen as the joint responsibility of executive and IT management. While this is an ongoing process with its success embedded in the firm's strategy and management processes, an important step forward can be dedicated time spent in the consideration of long term infrastructure investments. We have worked with business and technology managers using a workshop process to identify the infrastructure services required for the specific strategic context of the firm. We use the example of an internationally operating manufacturing firm we call WestCo. The major steps in the workshop process are described in the Appendix.

Members of WestCo's corporate management team, and selected business unit and IT managers, came together to review the future direction of WestCo's infrastructure investments. The level of the participant managers were such that they were all intimately acquainted with WestCo's mission and strategic thrusts. The only preparation was completion of a series of questions about WestCo's potential business synergies between business units and the preferred balance between realizing these and encouraging autonomy. WestCo drew on the generic business maxims (Figure 5) as a starting point to develop their own business maxims and then used the generic IT maxims (Figure 6) to shape their firm specific IT requirements. Possible barriers to implementation were noted for later discussion.

Participants decided that WestCo currently took a utility view of IT infrastructure but the business and IT maxims indicated that this might need to shift to a dependent view in the future.

This was verified by comparison with the benchmarks in Figure 8. The infrastructure services needed to achieve the business and IT maxims were listed drawing on the 23 services in Figure 9. These services were checked against WestCo's current capabilities and important gaps were identified. This indicated the direction and focus of the firm's future IT infrastructure investments.

The nature of the current infrastructure investment decision-making process was discussed and it was agreed that the firm's current approach was largely a deal making process. This was strongly motivated by efforts to reduce IT costs within each of the businesses and across the firm. While, in some cases, the CFO commented that infrastructure decisions had been made *"because we knew we just had to do it,"* the maxims workshop had highlighted gaps.

The business and IT maxims developed by the managers provide a well-informed base from which Westco will pursue consideration of IT infrastructure capabilities. An overview of the documentation resulting from the workshop is presented in Figure 13.

Of at least equal value was the nature of dialogue that had taken place during the day. Both business and IT executives had a deeper understanding of WestCo's business and IT strategy needs, particularly as they related to longer term investments. The firm did not need to start with a blank sheet or even with its own strategy documents. The business and IT maxims generated from other firms provided a time and energy-saving approach which WestCo's adapted to suit their firm-specific needs. The importance of joint business and IT responsibility for infrastructure became evident as IT managers explained what investments and time would be needed to operationalise some of the emerging business directions. There was acknowledgement that there would need to be some changes in the way in which WestCo usually justified infrastructure investments if the firm was to achieve its business objectives.

MANAGEMENT BY MAXIM

Creating the most appropriate set of infrastructure services involves a series of decision points based on a sound understanding of where the firm is going, rather than where it has been. This understanding starts with the strategic context of the firm and its businesses and leads to the articulation of business maxims. Business and IT maxims provide a basis for deciding on a view of infrastructure which matches these maxims and the firm's competitive positioning. The final step is the identification of specific infrastructure services which provide the IT capabilities to meet the firm's strategic context. Expectations need to be shared and discussed for a real dialogue to ensure appropriate infrastructure services are created. In this way there is a diversity of perspectives and the opportunity for fragmenting resources amongst competing strategy agendas is reduced.[24]

A useful diagnostic is to use these steps in reverse to identify if what is currently in place is well aligned with the firm's strategy and competitive positioning. The capability of current infrastructure services can be identified, together with the type of IT maxims and business maxims that would be supported by the current capabilities. In this way gaps and limitations

Figure 13: WestCo's Strategic Context and Infrastructure Services

WESTCO

Business Maxims:

- Lowest cost of sales (production & distribution & sell)
- Strong long-term relationship management with superior customer service
- Flexibility to respond quickly to market changes
- Realise the benefits of acquisitions and initiatives
- Identify, attract and facilitate movement of staff committed to one corporation
- Exceed client expectations for quality at reasonable price
- Culture of information sharing for achieving synergies

The Firm:

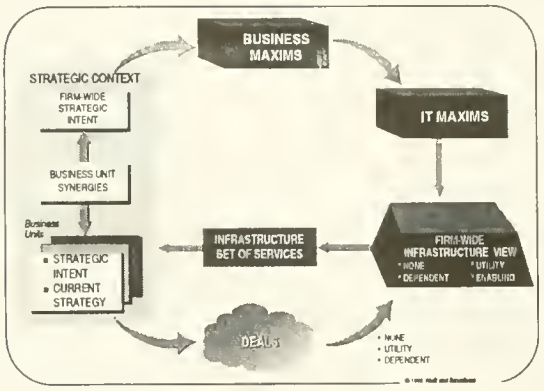
- A diversified manufacturing company serving global markets

IT Maxims:

- Each IT investment must support the firm's mission and values and support the current business plan
- Capture data once and provide appropriate flexible access. Data to include:
  - financial, human resources, key performance indicators, externally sourced
- Enforce firm-wide IT open architecture
  - computing
  - communications
  - selected data
  - selected applications (eg. SAP financials)
- Partnering with strong suppliers
- Firm-wide communications capability appropriately available, reliable and of sufficient capacity
- User ownership for IT investments and operations, which are measured on performance

Potential Synergies:

- Presence of all three value disciplines - operational excellence, customer intimacy and product innovation - across the businesses, with operational excellence the most predominant.
- Potential synergies
  - Very limited for products, customers and supplier base across all businesses
  - Considerable potential for sharing expertise in generic cross-business processes: managing financial resources & services, managing human resources, environment and safety policy, information systems infrastructure provision.



Infrastructure View: Utility → Dependent

Use of Synergies:

- Very important to utilise potential synergies
- Local autonomy of limited value

Firm-wide Infrastructure Services Required:

- Wide Area Network (WAN) linking domestic and international operations
- Firm-wide electronic mail system
- Recommendations on standards for all components of IT architecture
- Enforcement of selected IT architecture and standards through capital expenditure arrangements
- Security, disaster planning and business recovery services for the WAN
- Technology advice and support services available to the business groups
- Data management advice and consultancy services to the business groups on an ad-hoc, but proactive basis
- Identification and testing of new technologies for business purposes (in cooperation with the business groups)
- Electronic provision of management information (across all businesses)
- Firm-wide Executive Information System (EIS)
- Managing and negotiating with suppliers and outsourcers
- Performing IS project management (for firm-wide projects)
- Assisting the business groups in their IS planning
- Implementation of security, disaster planning and recovery for business units
- Development and management of online and / or EDI linkages to suppliers or customers for all business units

between what exists and what would be desirable can be clarified as a basis for dialogue and investment considerations. On the other hand, the firm might find that they have achieved a reasonable match between actual and desired capabilities through an intuitive process with strong communication and consistency in business and IT management processes.

In addition to its use for shared services in the IT area, the maxims approach can also be utilised by other parts of the firm. For example, financial or human resource management executives can use this approach to drive financial or HRM maxims as a way of identifying appropriate firm-wide financial and HRM services.

Identifying the appropriate view and investment in IT infrastructure services is a major challenge for firms continuously striving for business and IT alignment and for business value from IT investments. Management by maxims provide a basis for decision-making to achieve business driven IT infrastructure services. The process of management by maxim assists both corporate executive and IT management to surface, identify and achieve IT capabilities which are matched with business expressions of strategic intent, synergy and the primary value drivers in the firm.

APPENDIX

LINKING STRATEGY AND IT INFRASTRUCTURE INVESTMENTS: MAXIMS WORKSHOP OUTLINE

Preparation

Prior to the workshop day, each participant had spent 15 minutes responding to a series of questions about the nature of business synergies across WestCo and the preferred balance between exploiting these synergies and encouraging autonomy. Copies of the firm's mission and value statements were also available at the workshop.

The major steps of the workshop were:

1. Identifying the Extent of Business Synergies

   The first hour of the workshop was spent discussing and confirming the firm's preferred approach to its potential business synergies. Though WestCo appeared to share little by way of products and services, there was agreement that greater synergies could and should be achieved through sharing expertise in generic cross-business processes, such as managing financial resources, managing human resources, environment and safety policy and information systems infrastructure provision.

2. Articulating Business Maxims

   Participants used the generic business maxims in Figure 5 as a starting point. Each participant individually scored the importance of each business maxim to WestCo's future firm performance and then reviewed this to select their top six business maxims. Four business maxims were clearly agreed on by all participants and these were reworded to be more in line with the terminology used in WestCo. Decisions on the last two generated considerable discussion highlighting current debate about priorities and directions. In the end the managers agreed on the six business maxims through iteration of both previously agreed mission and vision statements and outcomes of ongoing strategizing. These business maxims were short pithy decrees, easily remembered and communicated. The participants checked to see if the balance amongst the maxims was reflective of firm priorities and did not exhibit internal conflicts. The difficulty of achieving all six maxims was acknowledged, together with the need to revisit these if their implementation required more extensive investments than the firm was prepared to outlay.

3. Identifying Information Technology Maxims

   Participants were divided into groups to commence work on IT maxims. The sample IT maxims in Figure 6 were used as a basis, with each group working on two or three categories. Each group then presented the IT maxims they had developed to the whole group. These were discussed and refined, checked for internal consistency, firm specificity, and then compared to the business maxims identified. Each business maxim usually leads to more than one IT maxim and there is often some overlap in the implications of the business maxims. As part of the process, some barriers to achieving the IT maxims were noted and recorded for later reference.

4. Clarifying IT Infrastructure View

The firm's future expectations for IT infrastructure investments were articulated by the CFO, who chairs the IT Council. At this point the nature of current investments, driven by a Utility view of infrastructure was acknowledged and verified with benchmarks (see Figure 8). The workshop outcome indicated that to achieve the firm's business maxims, particularly realising the benefits of acquisitions and firm-wide initiatives, the firm would need to change its view of IT infrastructure from a utility to a dependent view.

5. Specifying the Infrastructure Services Required

Using the list of 23 Infrastructure Services in Figure 9 as a basis, the CIO led the discussion of which services were essential in light of the business and IT maxims identified. It was agreed that 15 of these services were required to provide the IT capability necessary for the firm's strategic context and business maxims.

6. Reviewing the Linkages: Strategy to Infrastructure, Maxims and Deals

As a final step the participants reviewed the outcome as presented in Figure 13. The IT Infrastructure Manager stated that two of these services were not currently offered and that the extent of some current services would need to be extended. This would require some additional investments. Discussion then ensued about WestCo's past reliance on deal making decision processes and how this would need to shift in order to fund the infrastructure investments required to meet the firm's emerging maxims.

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[2] A major grant from IBM Consulting Group funded the study, *The Role and Payoff of Investments in Information Technology Infrastructure.* This involved 17 researchers undertaking detailed investigation of 27 firms in seven countries, and further case studies of firms with either leading-edge or no infrastructure investments. Additional funding was received from the Melbourne Business School Foundation and Hewlett Packard Australia to support travel to investigate *The Implications of International Business Operations for Information Technology Strategy* in 26 firms headquartered in six countries.

[3] Hamel, G. ("Strategy as Revolution," *Harvard Business Review*, July-August 1996, pp.69-82) differentiates between strategizing and planning and we include both of these activities to cover the range of firm experiences.

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[20] Drawing on: Earl, M.J.: *Management Strategies for Information Technology,* London, Prentice-Hall, 1989; Richardson, G.L., Jackson, B.M., and Dickson, G.W.: "A Principles-Based Enterprise Architecture: Lessons from Texaco and Star Enterprise", *MIS Quarterly*, 14:4, December 1990, pp.385-402; and Haeckel, S.H. and Nolan, R.L. "Managing by Wire", *Harvard Business Review,* Sept-Oct 1993, pp.123-132.

[21] While elements of each view can often be found in firms, one view predominates as described in "The Role and Value of Information Technology Infrastructure: Some Empirical Observations", by P.Weill. In *Strategic Information Technology Management: Perspectives on Organizational Growth and Competitive Advantage,* Ed. R. Banker, R. Kauffman, and M.A. Mahmood, Middleton, PA., Idea Group Publishing, 1993.

[22] This study, *The Role and Payoff of Investments in Information Technology Infrastructure,* was funded by a major grant from IBM Consulting Group. Further details in reference 2 above.

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[24] The argument and outcomes here parallel those of Hamel in "Strategy as Revolution", *Harvard Business Review*, July-August 1996, pp.69-82.

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